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Old Town, Maine Nov. 26, 1945
R.W. Feb 65

SPRUCE BUDWORM THREAT TO SPRUCE-BALSAM FIR FORESTS OF THE NORTHEAST

History: Some 25 years ago the spruce and balsam fir forests of Ontario, Quebec, Maine and the Maritime Provinces were devastated by the spruce budworm which defoliated trees and caused death. Upward of 30 million cords were killed in Maine, some townships losing as high as 90% of their balsam fir and very heavy amounts of spruce, most of which could not be salvaged. The attack came eastward from Ontario and Quebec, passing through Maine and the Maritime Provinces.

The pulp industry was able to keep going after this attack, because very considerable supplies of wood remained and because in the then undeveloped state of the industry in Canada, Maine mills were able to draw wood from that source.

Another spruce budworm devastation started some years ago in Ontario. It has gone both westward and eastward and has now reached the Adirondack forests of New York and into northern Vermont. Competent Entomologists expect it to strike New Hampshire, Maine and the Maritime Provinces within a few years. The intensity of the attack in Canada is appalling. Reports are that at the beginning of 1945 over 62,000 square miles were seriously affected, and 135,000 square miles lightly infested; the attack has spread further this year. Millions of cords have been lost.

On Sept. 14, 1945 the Canadian Government established a Forest Insects Control Board under the Department of Reconstruction and Supply, the Order in Council stating "that the losses through forest insects, particularly the current outbreak of the spruce budworm, represent a serious threat to the future of Canadian forest industries....."

that the epidemic has now reached the stage when national action is required.....that it shall be the duty of the Board to take all possible steps, both separately and in cooperation with the Provinces and Forest Industry, to control forest insect outbreaks, particularly the spruce budworm.

Situation of the Northeast: The pulp industry, and a certain part of the lumber industry, is dependent on spruce and balsam fir, heavily supplemented by imports from Canada. Some amounts of hardwoods are now being used for pulp but spruce and balsam fir are necessary. Vast quantities of Yellow Birch and White Birch, which would have supplemented the hardwood pulpwood supply, have been killed within the past few years by a borer which has spread westward from New Brunswick, through Maine, into New Hampshire and Vermont.

The most recent estimate of the spruce-fir stand in the northeastern United States, computed by the United States Forest Service, together with the annual pulpwood consumption of each state, broken into domestic and Canadian sources, is as follows:

State	Commercial Spruce - Fir Stand: M Cords	Domestic Wood Consumption M Cords	Imported From Canada: M Cords	Total Consumption M Cords
Maine	54,543	806	392	1,198
New Hampshire	4,969	371	18	389
Vermont	4,974	19	2	21
Massachusetts	39	5	25	30
New York	6,513	337	469	806
	51,038	1,538	906	2,444

It is apparent that 35% of the necessary pulpwood supply is brought in from Canada. But if the Canadian forests are devastated that source is apt to be weakened, particularly in view of the demands made by Canadian mills. The pulp and paper industry is, therefore, threatened.

Census data shows 94 pulpmills in the Northeast, an investment of over a half billion dollars, with over a quarter billion dollars value of annual product. Pulp and paper mills employ over 55,000 workers, with probably 300,000 other persons dependent on them, and the annual pay roll tops 60 million dollars.

*Property level of the north
country controlled by activity
of industry*

In addition to Spruce and Balsam Fir used for pulpwood, as above stated, very considerable amounts are put into lumber. United States Forest Service data indicate a total annual cut for the year of 1,835,000 cords, as compared with the 1,538,000 cords cut for pulpwood. Plants, investments and workers in the lumber industry are also threatened.

Figures on Spruce and Balsam Fir annual increment are not too definitive, considerable data still being required to perfect them. The best ones available, however, indicate that, except in New York, the balance is unfavorable, and that the cut is exceeding growth. Improved methods can undoubtedly change this, but if capital stock is destroyed by the budworm a very serious situation is bound to exist. It takes a long time to recover; some of the lands in Maine, which were devastated 25 years ago, are just beginning to come back, and many are still in the thicket stage.

Control of Spruce Budworm: There are four possible methods:

(1) Insecticides: DDT spraying from airplanes has been used in both Canada and the United States, but particularly in Canada whose authorities are cooperating closely with our men. The attack is in full blaze there so that Canadian territory was the proper one to use, and 91,980 acres were sprayed in Ontario and Quebec during 1945. It has been determined that DDT applied at the rate of 1/4 lb. per acre will effectively control the budworm, application being made by a small plane, carrying only 500 lbs. of insecticide, and flying 50 ft. above the tree tops.

However, this whole matter of using DDT must still be considered in the experimental stage because final effects on wild life and other insects than the budworm cannot be determined until 1946. The mechanics and type of the various planes to be used still require further perfection; larger planes, carrying greater loads, and capable of working 50 to 150 miles from their base, must be tried out. Final costs, when put on a commercial basis, are still not known. Spray formulae should be improved, to avoid losses of material, which involves the study of the movement of various sized spray particles in the atmosphere. Effects of air movement must be studied. At first it was thought that planes would have to fly not over 100 ft. above tree tops, which is exceedingly risky, particularly if heavy planes carrying large loads are used; experiments at Beltsville Research Center now indicate that coverage can be obtained at heights of between 200 and 500 ft. More study right away is needed. Entomologists favour forest management as the ultimate preventative, but seem to be of the opinion that while a wide spread attack cannot be stopped dead, particularly with the rapid increase of budworm population which we are facing, nevertheless valuable stands may be protected and tree mortality enough delayed, so that at least salvage of considerable amounts of wood be had from them, during several years after the attack.

(2) Parasites: Search is being made for parasites in the western

United States and Canada, but none have so far been developed on which a certain result can be promised. Parasite search in Europe, if social conditions allow it, should go on. Entomologists generally believe that parasites will be more useful in holding down the spruce budworm to a normal population rather than in over-coming a heavy infestation. However this road should be still further explored.

(3) Disease: Mr. J.J.deGryse, Chief, Forest Insect Investigations of the Dominion of Canada, believes that a virus disease may be found in Europe, probably in Germany, which

will destroy the spruce budworm. Mr. deGryse is familiar with European forests, as well as Canadian and American ones, and states that European forests are not subject to the spruce budworm devastations that ours are, and thinks that there may be a probability that disease is holding the insect in check there. He is moving, through the Canadian Government, to establish a laboratory in Germany, but is of course up against Post War conditions, which make progress difficult. Our Federal Department of Entomology has been and should continue to be in close cooperation with the Canadians.

(4) Forest Management and Salvage: The Northeastern States have not yet been covered by the nation-wide Forest Survey, and this should be done as soon as possible, so that better information, than now exists, may be had on the location, volume, area, rate of growth and drain of forests. All investigations so far made indicate that preponderance of balsam-fir over spruce in the forest encourages spruce budworm epidemics. This is particularly true if large, over-mature and often

defective balsam-fir are left in cuttings, and unfortunately, on account of markets, that has often been the case, both in Canada and in the northeastern United States. The point is not wholly proved, however. Some sample areas have been set up on both sides of the line, but more should be done and as soon as possible. In addition it is claimed that shorter periods between cuts will result in vastly increased amounts per acre which can be taken from the land, on account of the saving of trees from mortality, and by increased annual increment where a suitable capital stock is left. An extension of these sample areas should be had in order to prove or dis-prove these points which are highly important in the long run, and which Entomologists believe may be the final and ultimate solution of the spruce budworm menace.

The United States Forest Service proposes the establishment of local Work Centers in various parts of the country, and more particularly in view of the spruce budworm situation, wishes to establish them immediately in Maine, New Hampshire and New York, and to give high priority to anything which will mitigate the spruce budworm.

The idea of Experimental Work Centers is to put research men into the various localities being studied. The task is to expand research, to get better forest management systems tried out and proved, and to give interested owners a place, not too far removed, where their own problems may be solved. This decentralization movement is nationwide. In the case of the Northeastern Region 7 Centers have been proposed by the United States Forest Service, i.e. in Maine, New Hampshire, New York, Pennsylvania (3) and Maryland. The ones which we believe should immediately be provided for are those from which special studies, having to do with spruce budworm control, may be carried out. These are in Maine, New Hampshire and New York, subject to priority in every instance for budworm prevention and control measures.

The Maine Center would concentrate on the silviculture and economic management of the spruce-fir and northern hardwood forests of Maine, New Hampshire and Vermont; a new experimental forest should be established to test, on a large scale, the results of some 20 years plot research already at hand. One crew has been started on study of silvicultural measures to control the budworm: this force should be increased to at least 3 crews. Better forest type maps for the whole region should be prepared, and more detailed information obtained on areas highly vulnerable to spruce budworm attack. Experimental cuttings should be carried out to determine ways of immunizing stands from budworm attack, and these should not only determine methods, but costs, and economic feasibility.

The New Hampshire Center should cooperate with the Maine Center in spruce budworm control. Eventually it would study White Pine management. The Massabesic Experimental Forest of 4,000 acres would be administered from the Center, and various methods of cutting, etc. carried out, cooperating with existent experimental areas such as the Yale, Harvard and Syracuse Forests.

The New York Center also should at present cooperate on Spruce Budworm Control. The budworm is already in epidemic form in the Adirondacks and northern Vermont. Later the Center would specialize on farm and small forest ownership problems, together with supplemental research on the spruce-fir forest types of the state. Cooperation with other agencies, both public and private, on wood-lot cutting, mechanical devices, costs, etc., would be had.

As an essential part of forest management adequate road systems are needed. Many of the spruce and balsam-fir forests in the Northeast, particularly in northern Maine, are not pierced or approached by truck roads. It is not believed feasible for roads to be built to every individual spruce and balsam-fir stand, but it is believed that arterial roads should be constructed straightway, from which branch roads may be put into the individual stands. With this in view, and under the general coordination of the United States Forest Service it is proposed to construct forest type maps which will show the areas of special hazard, and will later be superceded by the maps of the regional Forest Survey. In Maine all existent forest type maps in the hands of the public authorities and private owners have been collected, and a forest type map of the state, with of course certain gaps where there is no existent data, is being drawn at the United States Forest Service Regional Office in Philadelphia. Inasmuch as the physical labor of doing this requires very considerable time, a preliminary map showing the development of areas of hazard has been constructed. (Map)

On this map, from the best sources of information which can be obtained, general locations of arterial roads are to be laid out and general costs of construction estimated. It is believed that such a road system will assist in proper forest management, and will also allow salvage of trees which may be killed, and which otherwise would rot.

Expenditures Against Spruce Budworm in 1945:

An estimate of amounts expended up to October 31, 1945
is as follows:

State Contributions

Maine:

Surveys by Forest Fire Wardens:	\$ 3,000.00	
Surveys and Studies by State		
Entomologist's Office:	16,800.00	
		\$ 19,800.00

Vermont:

Division of Plant Pest Control - Surveys	396.30	
Administrative Expenses:	100.00	
Office of State Forester*-Surveys:	200.00	
		696.30

New Hampshire:

State Entomologist's Office - Surveys	500.00	
		500.00

New York:

Conservation Department - Surveys	5,113.57	
Insecticides for Airplane Spraying Experiment:	212.50	
		5,326.07

University of Maine:

Part-time Services of Forest Entomologist on Staff of University of Maine:	2,250.00*	
		2,250.00

*Estimated contribution for fiscal year 1944-45.

Dominion of Canada

Entomological Branch:

Division of Forest Insects - Surveys:	\$25,000.00	
Ecological Studies (Including Buildings and Equipment)	60,000.00	
Airplane Spraying - DDT	10,000.00	
Dominion Parasite Laboratory - Parasites	10,000.00	
		\$105,000.00

Province of Ontario:

Airplane Spraying (about 100 sq.mi.) and construction of Sault Ste. Marie Laboratory	500,000.00**	
		\$500,000.00

Province of Quebec:

Airplane Spraying Experiments and Facilities in Connection with Cooperative Studies on the Spruce Budworm:	25,000.00**	
		\$ 25,000.00

Dom. F.S. - Green River Project 1945 - 3500"
Prov. N.B. - " " 3000
1946 - 10000

Timberland Owners

Brown Company, Berlin, New Hampshire:

Assistance in Establishing Forest Management
Control Area of Approximately 800 acres:

600.00

600.00

Eastern Pulpwood Company, Calais, Maine:

Cutting of a 20-acre Area Marked by U.S. Forest
Service for Determining Cost of Silvicultural
Control of Spruce Budworm:

Finch, Pruyn & Company, Glens Falls, New York:

The company has given permission to
establish forest management plots in cutover
areas on their lands:

Dead River Company, Bangor, Maine:

The 20,000-acre area is still being used for
study purposes.

Canadian International Paper Co, Maniwaki, Quebec:

A 500-acre forest management area has been
established in the Kabonga region of Quebec
for the purpose of determining (1) costs of
cutting practices, and (2) effect of such
cutting practices on budworm abundance in
stands already infested and subsequent damage
by the insect. The company will prepare
complete cost records for our use. Estimated
contribution in providing facilities for
setting up this area

1,000.00

1,000.00

TOTAL: \$660,172.37

**Estimated by J.J.deGryse.

The above total includes an estimated amount expended by
New Hampshire. Mr. W. M. Foss, New York State Conservation Department,
states that their office expects to expend approximately \$10,000. in
1946. The United States Forest Service is assigning men to make an
insect survey of the White Mountain and Green Mountain National Forests
to determine high hazard areas.

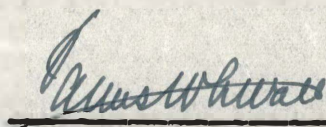
Requested Appropriation for the United States Forest Service
for fiscal year ending June 30, 1946 to begin establishment
of Work Centers in Maine, New Hampshire and New York,
work to be concentrated on Spruce Budworm Control: - \$30,000.

For fiscal year ending June 30, 1947: carrying
on said 3 Work Centers @ \$50,000. each - 150,000.

Requested Appropriation for the United States Bureau of
Entomology and Plant Quarantine, for further work on
Insecticides, Parasites and Disease, for fiscal year
ending June 30, 1946: 25,000.

(This in addition to present fund, which was \$75,000)

For year ending June 30, 1947 - 100,000.


_____, Chairman
FOREST INSECT COMMITTEE OF THE NORTHEAST

FOREST INSECT COMMITTEE OF THE NORTHEAST

Representatives of the various States and of Industry
serving on the Committee are as follows:

Maine:

Lee Abbott, c/o Wheatland & Phillips, Bangor, Maine
Gordon N. Antworth, Atlas Plywood Corporation, Patten, Maine
Robert W. Averill, Prentiss & Carlisle Company, Inc. Bangor, Maine
American Thread Company, Milo, Maine
Harry L. Beach, Oxford Paper Company, Portland, Maine
George D. Bearce, Maine Seaboard Paper Company, Bucksport, Maine
Kendrick Burns, S.D. Warren Company, Cumberland Mills, Maine
Grover C. Bradford, Wheatland & Phillips, Bangor, Maine
Gordon W. Blakeley, B-F-D. Co. Dixfield, Maine
George T. Carlisle, Cassidy Estate, Bangor, Maine
George D. Carlisle, Prentiss & Carlisle Company, Bangor, Maine
Harvey Clark, Hollis, Maine
Robert W. Cleaves, Cleaves Lumber Company, Portland, Maine
James D. Curtis, University of Maine, Orono, Maine
Henry Crowell, Skowhegan, Maine
D.B. Demeritt, University of Maine, Orono, Maine
Dr. C.O. Dirks, University of Maine, Orono, Maine
R.R. Drummond, Oxford Paper Company, Portland, Maine
Joseph G. Deering, Biddeford, Maine
R.W. Davis, Guilford Trust Co., Guilford, Maine
James E. Davis, Maine Seaboard Paper Co., Bucksport, Maine
Clarence A. Day, University of Maine, Orono, Maine
William E. Eggleston, Eastern Corporation, Bangor, Maine
Louis J. Freedman, Penobscot Development Company, Great Works, Maine
Harvey M. Hayward, Eastern Pulp Wood Company, Calais, Maine
E.R. Hendrick, International Paper Company, Chisholm, Maine
William Hilton, Great Northern Paper Company, Bangor, Maine
Bryant L. Hopkins, Waterville, Maine
C.M. Hutchins, Dead River Company, Bangor, Maine
Ernest F. Jones, Great Northern Paper Company, Bangor, Maine
E.L. Lamb, Oxford Paper Company, Rumford, Maine
Harry L. Hayes, St. Croix Paper Company, Woodland, Maine
Herbert E. Locke, Esq., Augusta, Maine
Edmund Melcher, S.D. Warren Company, Bingham, Maine
A.D. Nutting, University of Maine, Orono, Maine
George Olmsted, Jr., S.D. Warren Company, Cumberland Mills, Maine
Charles S. Paine, Eastern Corporation, Bangor, Maine
William Philbrick, Skowhegan, Maine
Leonard A. Pierce, Esq., Portland, Maine
James M. Pierce, Esq., Houlton, Maine
Francis Pearson, Eastern Pulp Wood Company, Calais, Maine
H.B. Pierson, Forest Commissioner's Office, Augusta, Maine
Raymond E. Rendall, Forest Commissioner, Augusta, Maine
E.L. Roberts, Atlas Plywood Corporation, Greenville, Maine
Earl W. Spaulding, Dead River Company, Bangor, Maine
George C. Sawyer, Houlton, Maine
Omar A. Sawyer, Hollingsworth & Whitney Co., Waterville, Maine
Rand Stowell, Dixfield, Maine
James W. Sewall, Consulting Forester, Old Town, Maine
David H. Stevens, State Tax Assessor, Augusta, Maine
C.P. Webber, Bangor, Maine
Stephen Wheatland, Bangor, Maine
C.C. Young, Pejepscot Paper Company, Brunswick, Maine

New Hampshire:

Albert M.Bean, Errol, New Hampshire
J.G.Conklin, Durham, New Hampshire
Raymond Blanchard, Blanchard Heirs, Berlin, New Hampshire
Halsey Edgerton, Dartmouth College, Hanover, New Hampshire
John Foster, State Forester, Concord, New Hampshire
Paul Glover, Northern New Hampshire Lumber Co., No.Stratford, N.H.
C.S.Herr, Brown Company, Berlin, New Hampshire
G.D.Keazer, St.Regis Paper Company, West Stewartstown, New Hampshire
E.Libby & Sons, Gorham, New Hampshire
E.A.Morrison, Forest Products Assoc. Groveton, New Hampshire
F.E.Moses, Groveton, New Hampshire
Willard Ruch, International Paper Co., North Stratford, N.H.
Myles Standish, Brown Company, Berlin, New Hampshire
L.W.Rathbun, Concord, New Hampshire
Mark Twitchell, Berlin, New Hampshire
Henry C.Waldo, Parker-Young Company, Lincoln, New Hampshire
Howard Woodward, Berlin, New Hampshire

Maryland:

F.C.Craighead, Bureau of Entomology, Beltsville Research Center,
Beltsville, Maryland
Lt.(jg) Joseph Sewall, NAS, VR-1, Patuxent River, Maryland

Massachusetts:

John A.Knowles, St.Croix Paper Company, Boston, Mass.
Amor Hollingsworth, Jr., Penobscot Chemical Fibre Co., Boston, Mass.
J.L.Madden, Hollingsworth & Whitney Co., Boston, Mass.
R.C.Madden, Hollingsworth & Whitney Co., Boston, Mass.
J.E.McLeod, Great Northern Paper Co., Boston, Mass.
A.H.Showalter, Mount Tom Sulphite Company, Mount Tom, Mass.
Karl A.Swenning, Hollingsworth & Whitney Co., Boston, Mass.
R.L.Trenholm, Parker-Young Company, Boston, Mass.

New York:

W.E.Becraft, International Paper Company, New York City
Lyman A.Beeman, Finch, Pruyn & Company, Glens Falls, New York
Julius Breckwoldt Company, Dolgeville, New York
H.E.Brinckerhoff, American Pulpwood Assoc. 220 East 42nd St., New York City
C.O.Brown, International Paper Co., New York City
W.J.Cowee Company, Berlin, New York
M.H.Collett, West Virginia Pulp & Paper Co., New York City
Fisher Forestry and Realty Co., Lyons Falls, New York
W.M.Foss, New York Conservation Dept., Albany, New York
Francis P.Garvan Estate, 654 Madison Ave., New York City
H.V.Hart, St.Regis Paper Company, Deferiet, New York
Hitchins Corporation, Sabattis, New York

New York:(Cont)

Rex W.Hovey, Oxford Paper Company, New York City
William G.Howard, Director, Div. of Lands and Forests, Albany, N.Y.
International Paper Company, New York City
A. Augustus Low, 4 Irving Place, New York 3, N.Y.
National Lead Company, 111 Broadway, New York City
Newton Falls Paper Co., Newton Falls, New York
Northern New York Development Co., 300 Erie Boulevard, Syracuse, N.Y.
Oval Wood Dish Company, Tupper Lake, New York
Racquette River Paper Company, Potsdam, New York
J.&J.Rogers Company, Ausable Forks, New York
Paul Smith Hotel Company, Paul Smiths, New York
St.Regis Paper Company, Deferiet, New York
Forest School, Syracuse University, Syracuse, New York
West Virginia Pulp & Paper Co., 230 Park Ave., New York City
Whitney Realty Company, 230 Park Ave., New York City
Emporium Forestry Company, Conifer, New York
Finch, Pruyn & Company, Glens Falls, New York
Gould Paper Company, Lyons Falls, New York
H.H.Tryon, Cornwall-on-Hudson, New York

Pennsylvania:

V.L.Harper, Director, Northeastern Forest Experiment Station,
Bankers Securities Bldg., Philadelphia, Pa.
M.Westveld, Northeastern Forest Experiment Station,
Bankers Securities Bldg., Philadelphia, Pa.
William T.Brust, Hammermill Paper Co., Erie, Penn.

Vermont:

Thomas W.Farwell, East Ryegate, Vermont
Perry H.Merrill, State Forester, Montpelier, Vermont
Harold T.Bailey, Montpelier, Vermont

Wisconsin:

John Stevens, Hr. Marathon Paper Mills Company, Rothschild, Wisconsin
H.S.Crosby, Sec.Forest Industries Inf.Company, Oshkosh, Wisconsin
F.G.Kilp, Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin

Canada:

Dr.R.E.Balch, Dominion Bureau of Entomology, Fredericton, New Brunswick
J.J.deGryse, Chief, Forest Insect Investigations, Dept.Agriculture,
Ottawa, Ontario
E.L.Howie, Fraser Companies, Ltd., Edmundston, New Brunswick
H.P.Klinestiver, Marathon Paper Mills, Ltd., Port Arthur, Ontario
R.G.MacFarlane, Fraser Companies, Ltd. Edmundston, New Brunswick
E.E.Shaw, Canadian International Paper Co., Montreal, Quebec
Phillips & Benner, Ruttan Block, Port Arthur, Ontario
K.B.Brown, University of New Brunswick, Fredericton, New Brunswick
G.H.Prince, Dept.Lands and Mines, Fredericton, New Brunswick

Canada: (Cont)

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Ralph S. Johnson, Mersey Paper Co. Ltd., Liverpool, Nova Scotia
L.A. Nix, Bathurst Power & Paper Co., Bathurst, New Brunswick
J.V. Perrin, Brown Corporation, St. Peter St., Quebec, P.Q.
A. Koroleff, Canadian Pulp & Paper Assoc., Montreal, Quebec
T.A. Earley, Brompton Pulp & Paper Co., East Angus, Quebec
J.F. Sharpe, Dept. Lands and Forests, Toronto, Ontario

Brown - Intercation
(Chief Forest - Pub. Relation)

Sweeney - Hollenarth & W. White
(Public Relation)

J. Rathburn - Soc. Prot. Wff Forest